REMARKS

With this Amendment, claims 32-46 are cancelled, and claims 16, 24, 27, and 28 are amended. Upon entry of this Amendment, claims 16-24, 27-31, and 47-63 are pending. Claims 47-63 have been indicated to be allowable. Reconsideration and review of the pending claims are respectfully requested.

Claims 16 and 24 are currently amended in part to eliminate limitations included in the last amendment that were then thought necessary to define over Lewis (GB 2,351,558). After further review of Lewis, as explained below, it is believed that these limitations are unnecessary.

103 Rejections

The Examiner has rejected claims 16, 17, 22, 24, 25-29, 30-33, 35, 37-42, 44-46 under 35 U.S.C. 103(a) as being unpatentable over Lewis (GB 2,351,558) in view of Eisen et al. (U.S Patent 6,717,168). The Examiner states that Lewis teaches an optical sensor, a first optical mask spaced from the optical sensor, the first optical mask having an aperture therethrough, a second optical mask located adjacent to the first mask with an aperture in series with the first mask, as recited in both independent claim 16 and independent claim 24. Applicant respectfully disagrees.

Lewis describes several embodiments of a spot detector 500. In one embodiment, described with reference to Fig. 2 of Lewis, the spot detector includes a single mask 518a having two apertures 122a and 120a. In other embodiments, such as shown Figs. 10A and 10B, the spot detector 500 includes multiple masks. As shown in Fig. 10B, each mask has multiple apertures. However, in no case of a spot detector described in Lewis is an aperture of a second mask in series with an aperture of a first mask. Lewis does not suggest such an arrangement either. In other words, in the spot detector of Lewis, light reflected from the web, having passed through an aperture of a first mask, does not then pass through an aperture of a second mask. Rather, the multiple apertures in a single mask in Lewis are used to generate a signal having a first pulse when the spot passes through the mask aperture 122a and a second pulse when the spot passes through the mask aperture 120a. This signal is then analyzed to determine the size and location in two dimensions of a spot or mark on the substrate. See page 8, last paragraph – page 9,

line 11. Further, the multiple masks are used to resolve different portions of the depth of field, such as when a distance between the substrate and a mask varies. See page 13, last paragraph – page 14, line 18.

Clearly the Eisen reference does not cure the deficiencies of Lewis in this regard, in that Eisen does not describe or suggest the use of any masks.

Thus, Applicant respectfully submits that claims 16 and 24 are allowable over Lewis alone, and over the combination of Lewis and Eisen, since neither reference teaches or suggests a scanning head including an optical sensor, a first optical mask spaced from the optical sensor, the first optical mask having an aperture therethrough, and a second optical mask located adjacent to the first mask with an aperture in series with the first mask, as recited in both independent claim 16 and in independent claim 24.

Because claims 17-23 and 29-31 depend from claim 16, and claims 27-28 depend from claim 24, these claims are allowable at least for the same reasons as discussed above, as well as for other reasons discussed below.

The Examiner also rejected claims 18-23 under 35 U.S.C. 103(a) as being unpatentable over Lewis in view of Eisen et al. (U.S. Patent No. 6,717,168) and further in view of Suda et al. (U.S. Pat. No. 4,589,842). Applicant disagrees.

In particular, Suda et al. does not disclose an apparatus for detecting register marks on a web surface. Rather, Suda et al. discloses a focus state detection apparatus for a camera for detecting a focusing state of an object. With reference to Figs. 5A and 5B of Suda et al., a focused state occurs when an objective or imaging lens 105 is adjusted to be at an appropriate distance from lens 102. With reference to Fig. 1, the focus state detection apparatus includes a field mask 101 and a multi-aperture stop 103. The Examiner refers to item 105 as a mask. However, item 105 in Fig. 1 is actually a photoelectric conversion device having four pixel arrays 105a, 105b, 105c, and 105d, and is clearly not a mask. A focused state is detected by analyzing the signals from the four pixel arrays.

As a first matter, the Examiner has failed to point out any suggestion or motivation for combining Lewis, Eisen, and Suda et al. Indeed, there is no suggestion in

Lewis or Eisen that it would be desirable to modify a mark detection system by looking to a focus detection apparatus for a camera.

Even assuming that motivation does exist to combine Lewis or Eisen with Suda et al., the specific way this would be accomplished to produce a workable device is unclear. It is mere hindsight to say that the combination could result in the scanning device defined by the claims. The arrangement of the masks 518 and photodetector in an apparatus as described by Lewis provides a signal that is analyzed to determine the location and size of a mark. The arrangement of the mask 101, lens 102, stop 103, lens 104, and photoelectric conversion device 105 in Suda et al. operate to produce signals such as shown in Figs. 8A-8C which signals can be analyzed in order to determine if an object is in focus. The signals from the photoelectric conversion device 105 in Suda et al. can not be analyzed to determine the location and size of a mark.

Further with respect to claim 18, neither Lewis, Eisen, or Suda et al. by any stretch shows or suggests a scanning head wherein a spacing between the first and the second mask that is of the order of ten times greater than the spacing of the first mask from the surface, as defined by claim 18. As mentioned above, Eisen does not disclose the use of masks in a scanning head. As for Lewis, the mask sandwich in Fig. 1 includes two masks which are both spaced a similar distance from the web surface and adjacent each other, such that the distance between the two masks is much smaller than the spacing of the first mask from the surface. With respect to Suda et al., the Examiner states that "Suda et al. teaches the same pattern of apertures in the first mask as compared with the second mask, however the area of mask one is larger, he teaches spacings between the first (101) and second masks (105)..." As pointed out above, item 105 in Suda et al. is NOT a mask but is a photoelectric conversion device. Also, the focus detection apparatus of Suda et al. is meant for use in a camera such that a distance between an object and mask 101 would be similar in magnitude to a distance between the object and the stop 103. Thus, it is believed that the general conditions of claim 18 are simply not disclosed by either Lewis, Eisen, or Suda et al., and the limitations of claim 18 do not involve only routine skill in the art.

With respect to claim 20, neither Lewis, Eisen, or Suda et al. shows or suggests a scanning head wherein the ratio between the area of the aperture of the second mask and

the area of the aperture of the first mask is substantially the same as the ratio of the spacing of the first and second masks relative to the spacing of the first mask from the surface, as defined by claim 20. As mentioned, in Lewis, the mask sandwich in Fig. 1 includes two masks which are both spaced a similar distance from the web surface and adjacent each other, such that the distance between the two masks is much smaller than the spacing of the first mask from the surface, and no relationship between these distances and the size of the apertures is mentioned or suggested. In Suda, the size of the apertures in mask 101 and stop 103 do not relate in any manner to a distance from these to the object that is being imaged. Thus, the general conditions of claim 20 are simply not disclosed by either Lewis, Eisen, or Suda et al., and the limitations of claim 20 do not involve only routine skill in the art.

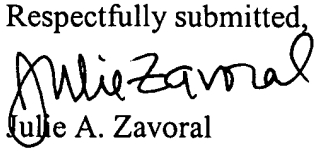
Further with respect to claim 21, neither Lewis, Eisen or Suda et al. shows or suggests a scanning head wherein the aperture of at least one of the first and second masks is of a shape that is the same as or similar to the shape of the registration mark sought on the web surface, as defined by claim 21. Such conditions are just not shown or suggested in Lewis. With respect to Suda et. al., the Examiner states "Suda et al. teaches a mask (103) with aperture that is similar to that as projected on subject (106) and multiple embodiments interchanging the patterns, shapes and sizes of masks." In Suda et al., the shape of the aperture in mask 101 and aperture of stop 103 are configured to produce a light distribution on the pixel arrays of the photoelectric conversion device 105 from which a focused state of an object can be determined. Applicant fails to understand how this shows an aperture of a mask which is of a shape the same as or similar to the shape of a registration mark sought on a web surface. Thus, the general conditions of claim 21 are simply not disclosed by either Lewis, Eisen, or Suda et al., and the limitations of claim 21 do not involve only routine skill in the art.

In summary, the combination of Lewis, Eisen and Suda et al. fails to teach or suggest each and every element of claims 18-23. Thus, Applicant respectfully submits that claims 18-23 are allowable over the cited art.

For each of these reasons, Applicant respectfully submits that claims 16-24, 27-31 are allowable. Applicant respectfully requests withdrawal of the Examiner's rejections and allowance of all remaining pending claims.

The undersigned is available for telephone conference at any time.

Respectfully submitted,



Julie A. Zavoral
Reg. No. 43,304

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Michael Best & Friedrich LLP
100 East Wisconsin Avenue
Suite 3300
Milwaukee, Wisconsin 53202-4108
414.271.6560